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APR 23 2004
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ENDONET.026CP1

PATENT

IMPLANTABLE MONITORING PROBE

Background of the Invention

This application is a divisional application of U.S. Application No. 09/544,373, filed April 6, 2000, now issued as U.S. Patent No. 6,689,056, which is a continuation-in-part of U.S. Application No. 09/287,617, filed April 7, 1999, now issued as U.S. Patent No. 6,285,897. The entire content of each of these U.S. Applications is incorporated herein by reference.

Field of the Invention

The present invention relates to minimally invasive physiological monitoring systems. More particularly, the present invention relates to an implantable probe for monitoring one or more parameters in the esophagus, such as pH, in connection with the detection of gastroesophageal reflux disease.

Description of the Related Art

Gastroesophageal reflux is a condition in which gastric acid refluxes, or flows in the direction opposite to the normal flow, from the stomach into the esophagus. Frequent reflux episodes may result in a potentially severe problem known as gastroesophageal reflux disease (GERD). GERD is the most common cause of dyspepsia or heartburn. GERD affects approximately 75 million adults in the United States on at least an intermittent basis, and approximately 13 million adults on a daily basis. As a common cause of chest pain, GERD frequently mimics the symptoms of a myocardial infarction or severe angina pectoris, which are signs of severe coronary artery disease. Because their treatments and outcomes are different, distinguishing between GERD and coronary artery disease is of paramount diagnostic importance to the patient and physician.

The lower esophageal sphincter (LES), or valve, is composed of a smooth muscle ring located at the gastroesophageal junction, and it plays a key role in the pathogenesis of GERD. Factors that cause or contribute to GERD include the following: transient relaxation of the LES, delayed stomach emptying, and ineffective esophageal clearance. Another cause of GERD is decreased resting tone of the LES, which produces incompetence (incomplete closing) of the LES.

At rest, the LES maintains a high pressure, between 10 and 30 mm Hg above intragastric pressure. Upon deglutition (swallowing), the LES relaxes before the esophagus contracts, allowing food to pass through into the stomach. After food passes into the stomach, the LES contracts to prevent the stomach contents, including gastric acid, from refluxing into the esophagus. The mechanism of the LES contraction and relaxation